

# LAB PROGRAMS

## UNIT-1

**Done by:**

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B.Tech AI & DS

1. Perform the following mathematical operations in R: addition, subtraction, multiplication, division, and exponentiation with two numbers

(e.g., 8 and 2).

**PROGRAM CODE:**

v = 8

t = 2

```
cat("Addition: ",v+t,"\\n")
cat("Subtraction: ",v-t,"\\n")
cat("Multiplication: ",v*t,"\\n")
cat("Division: ",v/t,"\\n")
cat("Exponent: ",v^t)
```

The screenshot shows the RStudio interface with the following details:

- Environment View:** Displays the global environment with variables v=8, t=2, and their results: row\_2\_sum=32L, row\_sums=c(28, 32, 36, 40), student\_averages=Named num [1:5] 84 86 70.7 85.3 73.3, sum\_columns=c(66, 72, 78, 84), sum\_rows=c(68, 100, 132), total\_sum=136L, upper=chr [1:10] "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z".
- Console View:** Shows the R session history:

```
R> v = 8
R> t = 2
R> cat("Addition: ",v+t,"\\n")
Addition: 10
R> cat("Subtraction: ",v-t,"\\n")
Subtraction: 6
R> cat("Multiplication: ",v*t,"\\n")
Multiplication: 16
R> cat("Division: ",v/t,"\\n")
Division: 4
R> cat("Exponent: ",v^t)
Exponent: 64
R> |
```
- File Explorer:** Shows the file system structure under Home, including RData, Rhistory, and several log files from 192324013-PRAJITH\_K-SSE-Gurupadigam\_Nov\_19\_2023.log to 192324013-PRAJITH\_K-Oct\_20th\_to\_26th\_2023.log.
- System Tray:** Shows battery level (ENG IN), signal strength, and the date/time (28-01-2025, 09:28).

2. Write an R script to create a data frame with employee details (ID, Name, Age, Salary). Perform operations to add a new column, filter rows based on a condition, and sort the data frame by salary.

**PROGRAM CODE:**

```
employee_details <- data.frame(id=c(1,2,3,4),
                                 name=c("Prajiith","Sandy","Prashanth","Mano"),
                                 age=c(18L,19L,18L,18),
                                 salary=c(100000.80,80000,90000,75000))

print("Before adding new column:\n")
print(employee_details)

print("\nAfter adding new column\n")
employee_details$job <- c("CEO","WORKER","EMPLOYEE","SALESMAN")
print(employee_details)

print("\nFiltered rows based on a condition:\n")
filtered <- subset(employee_details,salary>75000)
print(filtered)

print("\nSorted employee details based on a column:\n")
sorted_employee_details <- employee_details[order(employee_details$salary),]
print(sorted_employee_details)
```

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Source on Save Run Source

```
1 employee_details <- data.frame(id=c(1,2,3,4),  
2 name=c("Prajiith", "Sandy", "Prashanth", "Mano"),  
3 age=c(18L, 19L, 18L, 18L),  
4 salary=c(100000.80, 80000, 90000, 75000))  
5 print("Before adding new column:\n")  
6 print(employee_details)  
7  
8 print("\nAfter adding new column:\n")  
9 employee_details$job <- c("CEO", "WORKER", "EMPLOYEE", "SALESMAN")  
10 print(employee_details)  
11  
12 print("\nFiltered rows based on a condition:\n")  
13 filtered <- subset(employee_details, salary>75000)  
14 print(filtered)  
15  
16 print("\nSorted employee details based on a column:\n")  
17 sorted_employee_details <- employee_details[order(employee_details$salary),]  
18 print(sorted_employee_details)
```

R Script

Console Terminal Background Jobs

```
[1] "Before adding new column:\n"  
> print(employee_details)  
#> #> #> #>  
#> id name age salary job  
#> 1 Prajiith 18 100000.8 CEO  
#> 2 Sandy 19 80000.0 WORKER  
#> 3 Prashanth 18 90000.0 EMPLOYEE  
#> 4 Mano 18 75000.0 SALESMAN  
  
> print("\nAfter adding new column:\n")  
[1] "\nAfter adding new column:\n"  
> employee_details$job <- c("CEO", "WORKER", "EMPLOYEE", "SALESMAN")  
> print(employee_details)  
#> #> #> #>  
#> id name age salary job  
#> 1 Prajiith 18 100000.8 CEO  
#> 2 Sandy 19 80000.0 WORKER  
#> 3 Prashanth 18 90000.0 EMPLOYEE  
#> 4 Mano 18 75000.0 SALESMAN  
  
> print("\nFiltered rows based on a condition:\n")  
[1] "\nFiltered rows based on a condition:\n"  
> filtered <- subset(employee_details, salary>75000)  
> print(filtered)  
#> #> #>  
#> id name age salary job  
#> 1 Prajiith 18 100000.8 CEO  
#> 2 Sandy 19 80000.0 WORKER  
#> 3 Prashanth 18 90000.0 EMPLOYEE  
#> 4 Mano 18 75000.0 SALESMAN  
  
> print("\nUnsorted employee details based on a column:\n")  
[1] "\nUnsorted employee details based on a column:\n"  
> sorted_employee_details <- employee_details[order(employee_details$salary),]  
> print(sorted_employee_details)  
#> #> #>  
#> id name age salary job  
#> 1 Prajiith 18 100000.8 CEO  
#> 2 Sandy 19 80000.0 WORKER  
#> 3 Prashanth 18 90000.0 EMPLOYEE  
#> 4 Mano 18 75000.0 SALESMAN
```

Project: (None)

Environment History Connections Tutorial

R Global Environment

sorted\_employee\_ 4 obs. of 5 variables

student\_scores num [1:5, 1:7] 90 80 32 69 80 83 97 99 100 ...

submatrix int [1:3, 1:3] 2 3 4 6 7 8 10 11 12

sum\_layers int [1:4, 1:3] 14 16 18 20 22 24 26 28 30 3 ...

Values

a chr [1:10] "a" "b" "c" "d" "e" "f" "g" "h" "i" "j"

and logi [1:5] FALSE FALSE TRUE TRUE FALSE

array num [1:5, 1:3, 1:2] 50 52 54 56 58 60 62 64 6 ...

array\_data int [1:4, 1:3] 1 2 3 4 5 6 7 8 9 10 ...

average\_scores Named num [1:5] 77.8 69.76 83.76

Files Plots Packages Help Viewer Presentation

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Home

Name	Size	Modified
.RData	41 KB	Jan 27, 2025, 12:08 AM
.Rhistory	19 KB	Jan 27, 2025, 7:50 PM
192324013-PRAJITH_K-SSE-Gurupadigam Nov..._RData	867.5 KB	Nov 19, 2023, 9:33 PM
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desktop.ini	418 B	Jan 9, 2024, 7:34 PM
FULL ADDER.cir	4.2 KB	Apr 5, 2024, 2:16 PM
HALF SUB.cir	3.3 KB	Apr 5, 2024, 2:24 PM
NetBeansProjects		

ENG IN 09:29 28-01-2025

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Source on Save Run Source

```
1 employee_details <- data.frame(id=c(1,2,3,4),  
2 name=c("Prajiith", "Sandy", "Prashanth", "Mano"),  
3 age=c(18L, 19L, 18L, 18L),  
4 salary=c(100000.80, 80000, 90000, 75000))  
5 print("Before adding new column:\n")  
6 print(employee_details)  
7  
8 print("\nAfter adding new column:\n")  
9 employee_details$job <- c("CEO", "WORKER", "EMPLOYEE", "SALESMAN")  
10 print(employee_details)  
11  
12 print("\nFiltered rows based on a condition:\n")  
13 filtered <- subset(employee_details, salary>75000)  
14 print(filtered)  
15  
16 print("\nUnsorted employee details based on a column:\n")  
17 sorted_employee_details <- employee_details[order(employee_details$salary),]  
18 print(sorted_employee_details)
```

R Script

Console Terminal Background Jobs

```
[1] "Before adding new column:\n"  
> print(employee_details)  
#> #> #> #>  
#> id name age salary job  
#> 1 Prajiith 18 100000.8 CEO  
#> 2 Sandy 19 80000.0 WORKER  
#> 3 Prashanth 18 90000.0 EMPLOYEE  
#> 4 Mano 18 75000.0 SALESMAN  
  
> print("\nAfter adding new column:\n")  
[1] "\nAfter adding new column:\n"  
> employee_details$job <- c("CEO", "WORKER", "EMPLOYEE", "SALESMAN")  
> print(employee_details)  
#> #> #> #>  
#> id name age salary job  
#> 1 Prajiith 18 100000.8 CEO  
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> print("\nFiltered rows based on a condition:\n")  
[1] "\nFiltered rows based on a condition:\n"  
> filtered <- subset(employee_details, salary>75000)  
> print(filtered)  
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#> id name age salary job  
#> 1 Prajiith 18 100000.8 CEO  
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#> 3 Prashanth 18 90000.0 EMPLOYEE  
#> 4 Mano 18 75000.0 SALESMAN  
  
> print("\nUnsorted employee details based on a column:\n")  
[1] "\nUnsorted employee details based on a column:\n"  
> sorted_employee_details <- employee_details[order(employee_details$salary),]  
> print(sorted_employee_details)  
#> #> #>  
#> id name age salary job  
#> 1 Prajiith 18 100000.8 CEO  
#> 2 Sandy 19 80000.0 WORKER  
#> 3 Prashanth 18 90000.0 EMPLOYEE  
#> 4 Mano 18 75000.0 SALESMAN
```

Project: (None)

Environment History Connections Tutorial

R Global Environment

sorted\_employee\_ 4 obs. of 5 variables

student\_scores num [1:5, 1:7] 90 80 32 69 80 83 97 99 100 ...

submatrix int [1:3, 1:3] 2 3 4 6 7 8 10 11 12

sum\_layers int [1:4, 1:3] 14 16 18 20 22 24 26 28 30 3 ...

Values

a chr [1:10] "a" "b" "c" "d" "e" "f" "g" "h" "i" "j"

and logi [1:5] FALSE FALSE TRUE TRUE FALSE

array num [1:5, 1:3, 1:2] 50 52 54 56 58 60 62 64 6 ...

array\_data int [1:4, 1:3] 1 2 3 4 5 6 7 8 9 10 ...

average\_scores Named num [1:5] 77.8 69.76 83.76

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3. Write an R script to perform operations such as slicing, reshaping, and calculating the sum of elements along different dimensions.

**PROGRAM CODE:**

```
matrix_data <- matrix(1:16, nrow = 4, ncol = 4)  
print(matrix_data)
```

```
submatrix <- matrix_data[2:4, 1:3]  
print(submatrix)
```

```
reshaped_matrix <- matrix(as.vector(matrix_data), nrow = 2, ncol = 8)  
print(reshaped_matrix)
```

```
total_sum <- sum(matrix_data)  
print(total_sum)
```

```
row_sums <- rowSums(matrix_data)  
print(row_sums)
```

```
column_sums <- colSums(matrix_data)  
print(column_sums)
```

```
row_2_sum <- sum(matrix_data[2, ])  
print(row_2_sum)
```

```
column_3_sum <- sum(matrix_data[, 3])  
print(column_3_sum)
```

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Source on Save | Go to file/function | Addins |

```
1 matrix_data <- matrix(1:16, nrow = 4, ncol = 4)
2 print(matrix_data)
3
4 submatrix <- matrix_data[2:4, 1:3]
5 print(submatrix)
6
7 reshaped_matrix <- matrix(as.vector(matrix_data), nrow = 2, ncol = 8)
8 print(reshaped_matrix)
9
10 total_sum <- sum(matrix_data)
11 print(total_sum)
12
13 row_sums <- rowSums(matrix_data)
14 print(row_sums)
15
16 column_sums <- colSums(matrix_data)
17 print(column_sums)
18
19 row_2_sum <- sum(matrix_data[2, ])
20 print(row_2_sum)
21
22 column_3_sum <- sum(matrix_data[, 3])
23 print(column_3_sum)
24
25 (Top Level) :
```

Console Terminal Background Jobs

```
R 4.4.2 : ~
```

```
> matrix_data <- matrix(1:16, nrow = 4, ncol = 4)
> print(matrix_data)
[1,] 1 5 9 13
[2,] 2 6 10 14
[3,] 3 7 11 15
[4,] 4 8 12 16
>
> submatrix <- matrix_data[2:4, 1:3]
> print(submatrix)
[1,] 2 6 10
[2,] 3 7 11
[3,] 4 8 12
>
```

Environment History Connections Tutorial

R - Global Environment

or	logi [1:5] TRUE FALSE TRUE TRUE TRUE
physics_marks	num [1:5] 79 81 81 87 90
r	"Prajith Sandy Prashanth"
row_2_sum	32L
row_sums	num [1:4] 28 32 36 40
student_averages	Named num [1:5] 84 86 70.7 85.3 73.3
sum_columns	num [1:4] 66 72 78 84
sum_rows	num [1:3] 68 100 132
t	2
total_sum	136L

Files Plots Packages Help Viewer Presentation

Project (None)

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RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Source on Save | Go to file/function | Addins |

```
1 matrix_data <- matrix(1:16, nrow = 4, ncol = 4)
2 print(matrix_data)
3
4 submatrix <- matrix_data[2:4, 1:3]
5 print(submatrix)
6
7 reshaped_matrix <- matrix(as.vector(matrix_data), nrow = 2, ncol = 8)
8 print(reshaped_matrix)
9
10 total_sum <- sum(matrix_data)
11 print(total_sum)
12
13 row_sums <- rowSums(matrix_data)
14 print(row_sums)
15
16 column_sums <- colSums(matrix_data)
17 print(column_sums)
18
19 row_2_sum <- sum(matrix_data[2, ])
20 print(row_2_sum)
21
22 column_3_sum <- sum(matrix_data[, 3])
23 print(column_3_sum)
24
25 (Top Level) :
```

Console Terminal Background Jobs

```
R 4.4.2 : ~
```

```
> reshaped_matrix <- matrix(as.vector(matrix_data), nrow = 2, ncol = 8)
> print(reshaped_matrix)
[1,] 1 3 5 [4,] 7 9 11 13 15
[2,] 2 4 6 8 10 12 14 16
>
> total_sum <- sum(matrix_data)
> print(total_sum)
[1] 136
>
> row_sums <- rowSums(matrix_data)
> print(row_sums)
[1] 28 32 36 40
>
> column_sums <- colSums(matrix_data)
```

Environment History Connections Tutorial

R - Global Environment

or	logi [1:5] TRUE FALSE TRUE TRUE TRUE
physics_marks	num [1:5] 79 81 81 87 90
r	"Prajith Sandy Prashanth"
row_2_sum	32L
row_sums	num [1:4] 28 32 36 40
student_averages	Named num [1:5] 84 86 70.7 85.3 73.3
sum_columns	num [1:4] 66 72 78 84
sum_rows	num [1:3] 68 100 132
t	2
total_sum	136L

Files Plots Packages Help Viewer Presentation

Project (None)

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HALF SUB.circ	3.3 KB	Apr 5, 2024, 2:24 PM
NetBeansProjects		

ENG IN 09:30 28-01-2025

The screenshot shows the RStudio interface running on a Windows operating system. The main window is divided into several panes:

- Script Editor:** Displays an R script named LAB-3.R with code for matrix operations.
- Environment:** Shows the global environment with objects like `logi`, `physics_marks`, `r`, `row_2_sum`, `row_sums`, `student_averages`, `sum_columns`, `sum_rows`, `t`, and `total_sum`.
- File Browser:** Shows the file structure under "Home".
- System Tray:** Shows battery level (ENG IN), signal strength, and date/time (28-01-2025, 09:30).

```
matrix_data <- matrix(1:16, nrow = 4, ncol = 4)
print(matrix_data)
submatrix <- matrix_data[2:4, 1:3]
print(submatrix)
reshaped_matrix <- matrix(as.vector(matrix_data), nrow = 2, ncol = 8)
print(reshaped_matrix)
total_sum <- sum(matrix_data)
print(total_sum)
row_sums <- rowSums(matrix_data)
print(row_sums)
column_sums <- colSums(matrix_data)
print(column_sums)
row_2_sum <- sum(matrix_data[2, ])
print(row_2_sum)
column_3_sum <- sum(matrix_data[, 3])
print(column_3_sum)
> |
```

```
R 4.4.2 : ~ / 
> print(row_sums)
[1] 28 32 36 40
>
> column_sums <- colSums(matrix_data)
> print(column_sums)
[1] 10 26 42 58
>
> row_2_sum <- sum(matrix_data[2, ])
> print(row_2_sum)
[1] 32
>
> column_3_sum <- sum(matrix_data[, 3])
> print(column_3_sum)
[1] 42
> |
```

4. Write an R program to create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and the sum of numbers from 51 to 91.

### **PROGRAM CODE:**

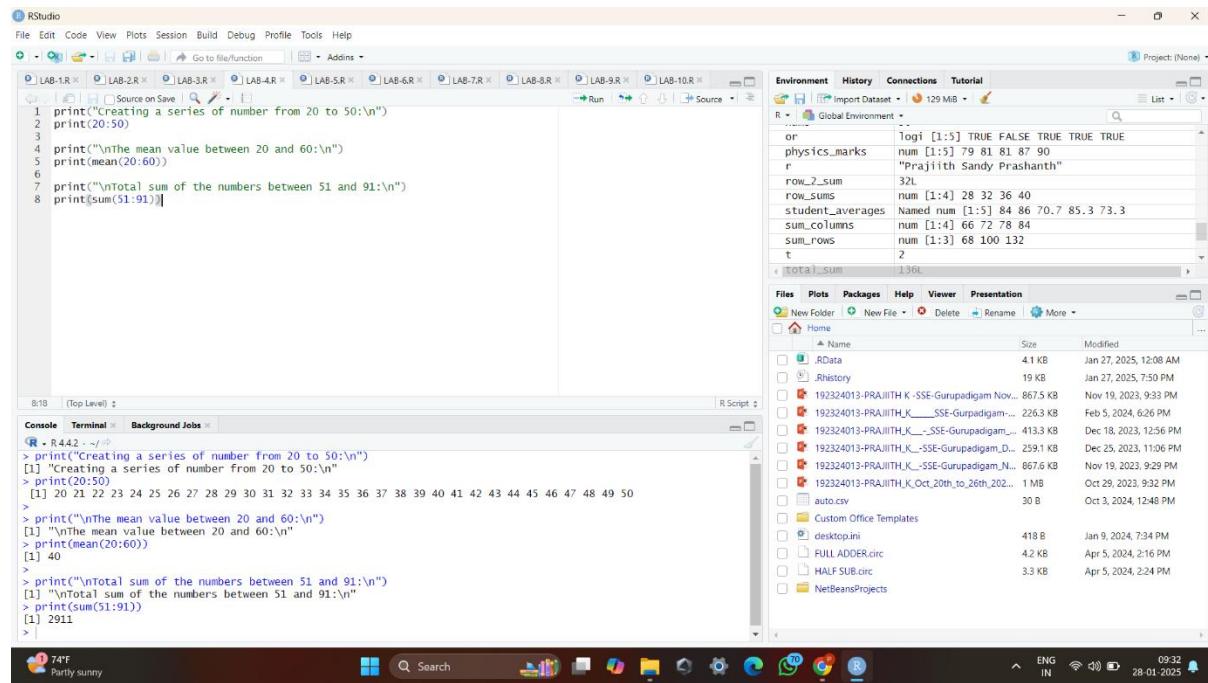
```
print("Creating a series of number from 20 to 50:\n")
print(20:50)
```

```
print("\nThe mean value between 20 and 60:\n")
```

```
print(mean(20:60))
```

```
print("\nTotal sum of the numbers between 51 and 91:\n")
```

```
print(sum(51:91))
```



The screenshot shows the RStudio interface with the following details:

- Code Editor:** Displays the R script with the provided code.
- Console:** Shows the output of the R code:

```
R 4.4.2 -->
> print("Creating a series of number from 20 to 50:\n")
[1] "Creating a series of number from 20 to 50:\n"
> print(20:50)
[1] 20 21 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
>
> print("\nThe mean value between 20 and 60:\n")
[1] "\nThe mean value between 20 and 60:\n"
> print(mean(20:60))
[1] 40
>
> print("\nTotal sum of the numbers between 51 and 91:\n")
[1] "\nTotal sum of the numbers between 51 and 91:\n"
> print(sum(51:91))
[1] 2911
```
- Environment View:** Shows the global environment with variables like `or`, `physics_marks`, `row_2_sum`, etc., and their values.
- File Explorer:** Shows the file structure in the current directory, including files like `.RData`, `.Rhistory`, and various log files.
- System Tray:** Shows the date and time (28-01-2025), battery level (74%), and other system status indicators.

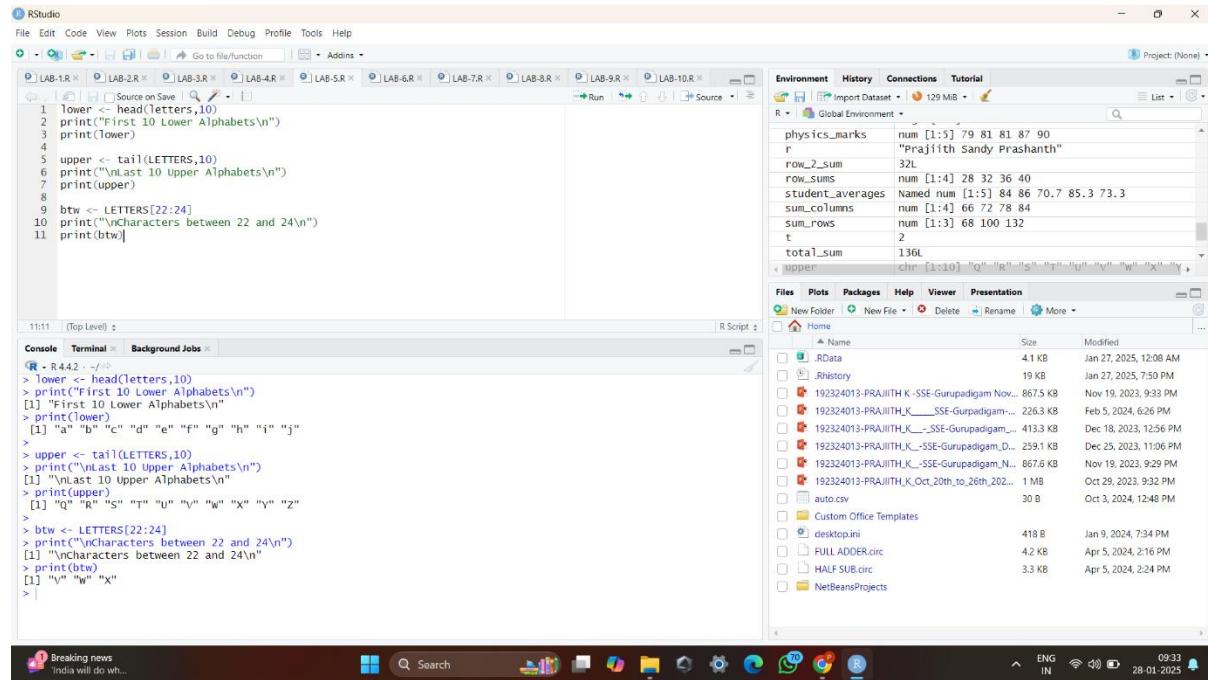
5. Write an R program to extract the first 10 English letters in lower case and the last 10 letters in upper case and extract letters between the 22nd to 24th letters in upper case.

### **PROGRAM CODE:**

```
lower <- head(letters,10)
print("First 10 Lower Alphabets\n")
print(lower)
```

```
upper <- tail(LETTERS,10)
print("\nLast 10 Upper Alphabets\n")
print(upper)
```

```
btw <- LETTERS[22:24]
print("\nCharacters between 22 and 24\n")
print(btw)
```



The screenshot shows the RStudio interface with the following details:

- File Bar:** File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Project Bar:** Project (None).
- Source Editor:** Shows the R script with the code provided above.
- Environment View:** Displays global variables and their values.
- Files View:** Shows the file system structure under "Home".
- Console View:** Displays the R session output, showing the execution of the code and its results.
- Bottom Status Bar:** Shows system information like battery level, signal strength, and date/time.

6. Create a logical vector in R Script based on conditions applied to a numeric vector. Use logical operations (AND, OR, NOT) to perform complex filtering on the vector.

### **PROGRAM CODE:**

```
v <- c(5,90,40,30,20)
```

```
and <- (v<50) & (v>20)
```

```
num1 <- v[and]
```

```
cat("Filtering performed through and opeartor: ",num1,"\n")
```

```
or <- (v>100)|(v<50)
```

```
num2 <- v[or]
```

```
cat("\nFiltering performed through or opeartor: ",num2,"\n")
```

```
not <- !(v<50)
```

```
num3 <- v[not]
```

```
cat("\nFiltering performed through not opeartor: ",num3)
```

The screenshot shows the RStudio interface with the following details:

- Code Editor:** Displays the R script with the code provided above. Line 13 is highlighted.
- Console:** Shows the output of the R code execution. It includes:
  - Execution of `v <- c(5,90,40,30,20)`
  - Creation of logical vectors `and` and `or` based on conditions.
  - Output of filtered vectors `num1`, `num2`, and `num3`.
  - Final output message "Filtering performed through not opeartor: 90"
- Environment View:** Shows the global environment with objects like `r`, `row\_2\_sum`, `row\_sums`, etc., and their values.
- File Explorer:** Shows the file structure with files like .RData, History, and various log files.
- System Tray:** Shows system information like battery level, network status, and date/time (28-01-2025, 09:33).

7. Create a factor in R Script from a character vector of categorical data (e.g., colors). Explain the significance of factors in statistical analysis and demonstrate how to change the levels of a factor.

### **PROGRAM CODE:**

```
fruits <- c("Apple","Banana","Orange","Carrot","Apple","Banana","Orange","Carrot")
```

```
fruits_factors <- factor(fruits)
print(fruits_factors)
cat("Before modifying factors: ",levels(fruits_factors))

levels(fruits_factors)<- c("Red","Yellow","Orange","Saffron")
print(levels(fruits_factors))

print(fruits_factors)
cat("After modifying factors: ",levels(fruits_factors))
```

The screenshot shows the RStudio interface with the following details:

- Script Editor:** Displays the R script code provided above.
- Environment View:** Shows the global environment with objects like fruits, fruits\_factors, and their corresponding levels (Red, Yellow, Orange, Saffron).
- Console View:** Displays the R session output, showing the execution of the script and the resulting factor levels.
- File Explorer:** Shows the file system structure with various RData files and other project files.
- System Tray:** Shows system status icons including battery level, signal strength, and date/time.

8. Discuss the various data types in R (numeric, integer, character, logical, complex). Provide examples of each and write a script to demonstrate type conversion between them.

**PROGRAM CODE:**

```
num <- 12.34
cat("Value: ",num,"\\nData Type: ",class(num),"\\n")

int <- 7L
cat("Value: ",int,"\\nData Type: ",class(int),"\\n")

char <- "Hello, Prajiith!"
cat("Value: ",char,"\\nData Type: ",class(char),"\\n")

logic <- TRUE
cat("Value: ",logic,"\\nData Type: ",class(logic),"\\n")

comp <- 4 + 5i
cat("Value: ",comp,"\\nData Type: ",class(comp),"\\n")

cat("Numeric to Integer:", as.integer(num), "\\n")
cat("Character to Numeric:", as.numeric("45.67"), "\\n")
cat("Logical to Numeric:", as.numeric(logic), "\\n")
cat("Numeric to Logical:", as.logical(0), "\\n")
cat("Complex to Character:", as.character(comp), "\\n")
```

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins

R Script

```
1 num <- 12.34
2 cat("Value: ", num, "\nData Type: ", class(num), "\n")
3 int <- 7L
4 cat("Value: ", int, "\nData Type: ", class(int), "\n")
5 char <- "Hello, Prajith!"
6 cat("Value: ", char, "\nData Type: ", class(char), "\n")
7 logic <- TRUE
8 cat("Value: ", logic, "\nData Type: ", class(logic), "\n")
9 comp <- 4 + 5i
10 cat("Value: ", comp, "\nData Type: ", class(comp), "\n")
11 cat("Numeric to Integer:", as.integer(num), "\n")
12 cat("Character to Numeric:", as.numeric("45.67"), "\n")
13 cat("Logical to Numeric:", as.numeric(logic), "\n")
14 cat("Numeric to Logical:", as.logical(0), "\n")
15 cat("Complex to Character:", as.character(comp), "\n")
16 |
```

17:1 (Top Level) ↴

Console Terminal Background Jobs

```
R> R 4.4.2 ->
> num <- 12.34
> Cat("Value: ", num, "\nData Type: ", class(num), "\n")
Value: 12.34
Data Type: numeric
> int <- 7L
> cat("Value: ", int, "\nData Type: ", class(int), "\n")
Value: 7
Data Type: integer
> char <- "Hello, Prajith!"
> cat("Value: ", char, "\nData Type: ", class(char), "\n")
Value: Hello, Prajith!
Data Type: character
> logic <- TRUE
> cat("Value: ", logic, "\nData Type: ", class(logic), "\n")
Value: TRUE
Data Type: logical
> comp <- 4 + 5i
> cat("Value: ", comp, "\nData Type: ", class(comp), "\n")
```

Files Plots Packages Help Viewer Presentation

Home

Name	Size	Modified
.RData	41 KB	Jan 27, 2025, 12:08 AM
.History	19 KB	Jan 27, 2025, 7:50 PM
192324013-PRAJITH_K_SSE-Gurupadigam_Nov_19_2023.RData	867.5 KB	Nov 19, 2023, 9:33 PM
192324013-PRAJITH_K_SSE-Gurupadigam_.RData	226.3 KB	Feb 5, 2024, 6:26 PM
192324013-PRAJITH_K_SSE-Gurupadigam_.RData	413.3 KB	Dec 18, 2023, 12:56 PM
192324013-PRAJITH_K_SSE-Gurupadigam_Dec_25_2023.RData	259.1 KB	Dec 25, 2023, 11:06 PM
192324013-PRAJITH_K_SSE-Gurupadigam_Nov_19_2023.RData	867.6 KB	Nov 19, 2023, 9:29 PM
192324013-PRAJITH_K_Oct_20th_to_26th_2023.RData	1 MB	Oct 29, 2023, 9:32 PM
auto.csv	30 B	Oct 3, 2024, 12:48 PM
Custom Office Templates		
desktop.ini	418 B	Jan 9, 2024, 7:34 PM
FULL ADDER.circ	4.2 KB	Apr 5, 2024, 2:16 PM
HALF SUB.circ	3.3 KB	Apr 5, 2024, 2:24 PM
NetBeansProjects		

ENG IN 09:34 28-01-2025

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins

R Script

```
1 num <- 12.34
2 cat("Value: ", num, "\nData Type: ", class(num), "\n")
3 int <- 7L
4 cat("Value: ", int, "\nData Type: ", class(int), "\n")
5 char <- "Hello, Prajith!"
6 cat("Value: ", char, "\nData Type: ", class(char), "\n")
7 logic <- TRUE
8 cat("Value: ", logic, "\nData Type: ", class(logic), "\n")
9 comp <- 4 + 5i
10 cat("Value: ", comp, "\nData Type: ", class(comp), "\n")
11 cat("Numeric to Integer:", as.integer(num), "\n")
12 cat("Character to Numeric:", as.numeric("45.67"), "\n")
13 cat("Logical to Numeric:", as.numeric(logic), "\n")
14 cat("Numeric to Logical:", as.logical(0), "\n")
15 cat("Complex to Character:", as.character(comp), "\n")
16 |
```

17:1 (Top Level) ↴

Console Terminal Background Jobs

```
R> R 4.4.2 ->
> value. TRUE
Data Type: logical
> comp <- 4 + 5i
> cat("Value: ", comp, "\nData Type: ", class(comp), "\n")
Value: 4+5i
Data Type: complex
>
> cat("Numeric to Integer:", as.integer(num), "\n")
Numeric to Integer: 12
> cat("Character to Numeric:", as.numeric("45.67"), "\n")
Character to Numeric: 45.67
> cat("Logical to Numeric:", as.numeric(logic), "\n")
Logical to Numeric: 1
> cat("Numeric to Logical:", as.logical(0), "\n")
Numeric to Logical: FALSE
> cat("Complex to Character:", as.character(comp), "\n")
Complex to Character: 4+5i
> |
```

Files Plots Packages Help Viewer Presentation

Home

Name	Size	Modified
.RData	41 KB	Jan 27, 2025, 12:08 AM
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192324013-PRAJITH_K_SSE-Gurupadigam_Nov_19_2023.RData	867.5 KB	Nov 19, 2023, 9:33 PM
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192324013-PRAJITH_K_SSE-Gurupadigam_Nov_19_2023.RData	867.6 KB	Nov 19, 2023, 9:29 PM
192324013-PRAJITH_K_Oct_20th_to_26th_2023.RData	1 MB	Oct 29, 2023, 9:32 PM
auto.csv	30 B	Oct 3, 2024, 12:48 PM
Custom Office Templates		
desktop.ini	418 B	Jan 9, 2024, 7:34 PM
FULL ADDER.circ	4.2 KB	Apr 5, 2024, 2:16 PM
HALF SUB.circ	3.3 KB	Apr 5, 2024, 2:24 PM
NetBeansProjects		

ENG IN 09:34 28-01-2025

9. Write an R program to create a  $5 \times 4$  matrix, a  $3 \times 3$  matrix with labels and fill the matrix by rows, and a  $2 \times 2$  matrix with labels and fill the matrix by columns.

**PROGRAM CODE:**

```
labels_row1 <- c("row1","row2","row3","row4","row5")
labels_col1 <- c("col1","col2","col3","col4")

matrix_1 <-
matrix(c(1,2,3,4,5,6,7,8,9,1,2,3,4,5,6,7,8,9,1,2),nrow=5,byrow=TRUE,dimnames=list(labels_row1,labels_col1))
print(matrix_1)

labels_row2 <- c("row1","row2","row3")
labels_col2 <- c("col1","col2","col3")

matrix_2 <- matrix(c(1,2,3,4,5,6,7,8,9),nrow=3,byrow=TRUE,dimnames=list(labels_row2,labels_col2))
print(matrix_2)

labels_row3 <- c("row1","row2")
labels_col3 <- c("col1","col2")

matrix_3 <- matrix(c(1,2,3,4),ncol=2,byrow=TRUE,dimnames=list(labels_row3,labels_col3))
print(matrix_3)
```

RStudio interface showing R script execution and environment pane.

**R Script:**

```
1 Labels_row1 <- c("row1", "row2", "row3", "row4", "row5")
2 Labels_col1 <- c("col1", "col2", "col3", "col4")
3
4 matrix_1 <- matrix(c(1,2,3,4,5,6,7,8,9,1,2,3,4,5,6,7,8,9,1,2), nrow=5, byrow=TRUE, dimnames=list(Labels_row1, Labels_col1))
5 print(matrix_1)
6
7 Labels_row2 <- c("row1", "row2", "row3")
8 Labels_col2 <- c("col1", "col2", "col3")
9
10 matrix_2 <- matrix(c(1,2,3,4,5,6,7,8,9), nrow=3, byrow=TRUE, dimnames=list(Labels_row2, Labels_col2))
11 print(matrix_2)
12
13 Labels_row3 <- c("row1", "row2")
14 Labels_col3 <- c("col1", "col2")
15
16 matrix_3 <- matrix(c(1,2,3,4), ncol=2, byrow=TRUE, dimnames=list(Labels_row3, Labels_col3))
17 print(matrix_3)
```

**Console:**

```
> R 4.4.2 ->
> Labels_row1 <- c("row1", "row2", "row3", "row4", "row5")
> Labels_col1 <- c("col1", "col2", "col3", "col4")
>
> matrix_1 <- matrix(c(1,2,3,4,5,6,7,8,9,1,2,3,4,5,6,7,8,9,1,2), nrow=5, byrow=TRUE, dimnames=list(Labels_row1, Labels_col1))
> print(matrix_1)
  col1 col2 col3 col4
row1  1    2    3    4
row2  5    6    7    8
row3  9    1    2    3
row4  4    5    6    7
row5  8    9    1    2
>
> Labels_row2 <- c("row1", "row2", "row3")
> Labels_col2 <- c("col1", "col2", "col3")
>
> matrix_2 <- matrix(c(1,2,3,4,5,6,7,8,9), nrow=3, byrow=TRUE, dimnames=list(Labels_row2, Labels_col2))
> print(matrix_2)
```

**Environment:**

Value	Type	Content
matrix_3	num [1:2, 1:2]	1 3 2 4
matrix_data	int [1:4, 1:4]	1 2 3 4 5 6 7 8 9 10 ...
reshaped_matrix	int [1:2, 1:8]	1 2 3 4 5 6 7 8 9 10 ...
sorted_employee	4 obs. of 5 variables	
student_scores	num [1:5, 1:7]	90 80 32 69 80 83 97 99 100 ...
submatrix	int [1:3, 1:3]	2 3 4 6 7 8 10 11 12
sum_layers	int [1:4, 1:3]	14 16 18 20 22 24 26 28 30 3 ...
a	chr [1:10]	"a" "b" "c" "d" "e" "f" "g" "h" "i" "j"
and	logi [1:5]	FALSE FALSE TRUE TRUE FALSE

**Files:**

- RData
- .History
- 192324013-PRAJITH\_K-SSE-Gurupadigam Nov... (867.5 KB)
- 192324013-PRAJITH\_K---SSE-Gurupadigam... (226.3 KB)
- 192324013-PRAJITH\_K---SSE-Gurupadigam... (413.3 KB)
- 192324013-PRAJITH\_K---SSE-Gurupadigam... (259.1 KB)
- 192324013-PRAJITH\_K---SSE-Gurupadigam... (867.6 KB)
- 192324013-PRAJITH\_K\_Oct20th\_to\_26th202... (1 MB)
- auto.csv
- Custom Office Templates
- desktop.ini
- FULL ADDER.circ
- HALF SUB.circ
- NetBeansProjects

RStudio interface showing R script execution and environment pane.

**R Script:**

```
1 Labels_row1 <- c("row1", "row2", "row3", "row4", "row5")
2 Labels_col1 <- c("col1", "col2", "col3", "col4")
3
4 matrix_1 <- matrix(c(1,2,3,4,5,6,7,8,9,1,2,3,4,5,6,7,8,9,1,2), nrow=5, byrow=TRUE, dimnames=list(Labels_row1, Labels_col1))
5 print(matrix_1)
6
7 Labels_row2 <- c("row1", "row2", "row3")
8 Labels_col2 <- c("col1", "col2", "col3")
9
10 matrix_2 <- matrix(c(1,2,3,4,5,6,7,8,9), nrow=3, byrow=TRUE, dimnames=list(Labels_row2, Labels_col2))
11 print(matrix_2)
12
13 Labels_row3 <- c("row1", "row2")
14 Labels_col3 <- c("col1", "col2")
15
16 matrix_3 <- matrix(c(1,2,3,4), ncol=2, byrow=TRUE, dimnames=list(Labels_row3, Labels_col3))
17 print(matrix_3)
```

**Console:**

```
> R 4.4.2 ->
> Labels_col1 <- c("col1", "col2", "col3", "col4")
>
> matrix_1 <- matrix(c(1,2,3,4,5,6,7,8,9,1,2,3,4,5,6,7,8,9,1,2), nrow=5, byrow=TRUE, dimnames=list(Labels_row1, Labels_col1))
> print(matrix_1)
  col1 col2 col3 col4
row1  1    2    3    4
row2  5    6    7    8
row3  9    1    2    3
row4  4    5    6    7
row5  8    9    1    2
>
> Labels_row2 <- c("row1", "row2", "row3")
> Labels_col2 <- c("col1", "col2", "col3")
>
> matrix_2 <- matrix(c(1,2,3,4,5,6,7,8,9), nrow=3, byrow=TRUE, dimnames=list(Labels_row2, Labels_col2))
> print(matrix_2)
  col1 col2
row1  1    2
row2  3    4
> |
```

**Environment:**

Value	Type	Content
matrix_3	num [1:2, 1:2]	1 3 2 4
matrix_data	int [1:4, 1:4]	1 2 3 4 5 6 7 8 9 10 ...
reshaped_matrix	int [1:2, 1:8]	1 2 3 4 5 6 7 8 9 10 ...
sorted_employee	4 obs. of 5 variables	
student_scores	num [1:5, 1:7]	90 80 32 69 80 83 97 99 100 ...
submatrix	int [1:3, 1:3]	2 3 4 6 7 8 10 11 12
sum_layers	int [1:4, 1:3]	14 16 18 20 22 24 26 28 30 3 ...
a	chr [1:10]	"a" "b" "c" "d" "e" "f" "g" "h" "i" "j"
and	logi [1:5]	FALSE FALSE TRUE TRUE FALSE

**Files:**

- RData
- .History
- 192324013-PRAJITH\_K-SSE-Gurupadigam Nov... (867.5 KB)
- 192324013-PRAJITH\_K---SSE-Gurupadigam... (226.3 KB)
- 192324013-PRAJITH\_K---SSE-Gurupadigam... (413.3 KB)
- 192324013-PRAJITH\_K---SSE-Gurupadigam... (259.1 KB)
- 192324013-PRAJITH\_K---SSE-Gurupadigam... (867.6 KB)
- 192324013-PRAJITH\_K\_Oct20th\_to\_26th202... (1 MB)
- auto.csv
- Custom Office Templates
- desktop.ini
- FULL ADDER.circ
- HALF SUB.circ
- NetBeansProjects

10. Write an R program to create a two-dimensional 5x3 array of sequences of even integers greater than 50.

**PROGRAM CODE:**

```
even_integers <- seq(from=50,by=2,length.out=15)
```

```
print(even_integers)
```

```
array <-array(even_integers,c(5,3,2))
```

```
print(array)
```

The screenshot shows the RStudio interface with the following details:

- Script Editor:** Displays the R script code.
- Console:** Shows the output of the R code execution.
- Environment:** Shows the global environment with variables like `even_integers`, `array`, and `array[1]`.
- File Explorer:** Shows the file structure in the current directory.
- Taskbar:** Shows system icons and the date/time.

```
even_integers <- seq(from=50,by=2,length.out=15)
print(even_integers)
[1] 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78
array <-array(even_integers,c(5,3,2))
print(array)
, , 1
[1,] 50 60 70
[2,] 52 62 72
[3,] 54 64 74
[4,] 56 66 76
[5,] 58 68 78
, , 2
[1,] 50 60 70
[2,] 52 62 72
[3,] 54 64 74
[4,] 56 66 76
[5,] 58 68 78
```

11. Write an R Program to Access Values in a Vector. Print the vector.

**PROGRAM CODE:**

```
v <- c(100,90,30,50,60)
```

```
c <- v[c(5,3,1)]
```

```
print(c)
```

```
t <- v[c(TRUE,FALSE,TRUE,FALSE,TRUE)]
```

```
print(t)
```

The screenshot shows the RStudio interface with the following details:

- Code Editor:** Displays the R script with the following code:

```
1 v <- c(100,90,30,50,60)
2
3 c <- v[c(5,3,1)]
4 print(c)
5
6 t <- v[c(TRUE,FALSE,TRUE,FALSE,TRUE)]
7 print(t)
```
- Console:** Shows the output of the code execution:

```
> v <- c(100,90,30,50,60)
>
> c <- v[c(5,3,1)]
> print(c)
[1] 60 30 100
>
> t <- v[c(TRUE,FALSE,TRUE,FALSE,TRUE)]
> print(t)
[1] 100 30 60
> |
```
- Environment View:** Shows the global environment with variables and their values:

Variable	Type	Value
r	character	"Prajjith Sandy Prashanth"
row_2_sum	integer	32L
row_sums	numeric	[1:4] 28 32 36 40
student_aver...	Named numeric	[1:5] 84 86 70.7 85.3 73.3
sum_columns	numeric	[1:4] 66 72 78 84
sum_rows	numeric	[1:3] 68 100 132
t	numeric	[1:3] 100 30 60
total_sum	integer	136L
upper	character	[1:10] "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z"
v	numeric	[1:5] 100 90 30 50 60
- File Explorer:** Shows the file system structure:

Name	Size	Modified
.RData	4.1 KB	Jan 27, 2025, 12:08 AM
Rhistory	19 kB	Jan 27, 2025, 7:50 PM
192324013-PRAJITH_K_-SSE-Guru...	867.5 kB	Nov 19, 2023, 9:39 PM
192324013-PRAJITH_K____SSE-G...	2263 kB	Feb 5, 2024, 6:26 PM
192324013-PRAJITH_K____SSE-Gu...	413.3 kB	Dec 18, 2023, 12:56 PM
192324013-PRAJITH_K_-SSE-Guru...	259.1 kB	Dec 25, 2023, 11:06 PM
192324013-PRAJITH_K_-SSE-Guru...	867.6 kB	Nov 19, 2023, 9:29 PM
192324013-PRAJITH_K_Oct_20th_t...	1 MB	Oct 29, 2023, 9:32 PM
auto.csv	30 B	Oct 3, 2024, 12:48 PM
Custom Office Templates		
desktop.ini	418 B	Jan 9, 2024, 7:34 PM
FULL ADDRESS.circ	42 kB	Apr 5, 2024, 2:16 PM
HALF SUB.circ	3.3 kB	Apr 5, 2024, 2:24 PM
NetBeansProjects		
- System Tray:** Shows the weather (74°F, Partly sunny), battery level (ENG IN), and date/time (28-01-2025, 09:49).

12. Write an R Program to find Nth smallest value in vector .

**PROGRAM CODE:**

n=3

```
v <- c(7,14,27,26,30,24,6)
```

```
sorted <- sort(v)
```

```
nth_smallest_number <- sorted[n]
```

```
print(nth_smallest_number)
```

The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help, and Addins. The title bar shows multiple open projects: LAB-11.R, LAB-12.R, LAB-13.R, LAB-14.R, LAB-15.R, LAB-16.R, LAB-17.R, LAB-18.R, LAB-19.R, and LAB-20.R. The main area has two panes: the left pane contains the R script code, and the right pane shows the Global Environment and Files panes.

**R Script (Left Pane):**

```
1 n=3
2 v <- c(7,14,27,26,30,24,6)
3
4 sorted <- sort(v)
5 nth_smallest_number <- sorted[n]
6
7 print(nth_smallest_number)
8 |
```

**Global Environment (Right Pane):**

Name	Type	Value
row_2_sum	32L	
row_sums	num [1:4]	28 32 36 40
sorted	num [1:7]	6 7 14 24 26 27 30
student_aver	Named num [1:5]	84.86 70.7 85.3 73.3
sum_columns	num [1:4]	66 72 78 84
sum_rows	num [1:3]	68 100 132
t	num [1:3]	10 30 60
total_sum	136L	
upper	chr [1:10]	"Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z"
num	num [1:7]	7 14 27 26 30 24 6

**Files (Right Pane):**

- Home
- RData (4.1 KB, Jan 27, 2025, 12:08 AM)
- Rhistory (19 KB, Jan 27, 2025, 7:59 PM)
- 192324013-PRAJITH.K-SSE-Guru... (867.5 KB, Nov 19, 2023, 9:33 PM)
- 192324013-PRAJITH.K\_\_\_\_SSE-G... (226.3 KB, Feb 5, 2024, 6:26 PM)
- 192324013-PRAJITH.K\_\_SSE-Gur... (413.3 KB, Dec 18, 2023, 12:56 PM)
- 192324013-PRAJITH.K\_\_SSE-Guru... (259.1 KB, Dec 25, 2023, 11:06 PM)
- 192324013-PRAJITH.K\_\_SSE-Guru... (867.6 KB, Nov 19, 2023, 9:29 PM)
- 192324013-PRAJITH.K\_Oct.20th... (1 MB, Oct 29, 2023, 9:32 PM)
- auto.csv (30 B, Oct 3, 2024, 12:48 PM)
- Custom Office Templates
- desktop.ini (418 B, Jan 9, 2024, 7:34 PM)
- FULL ADDER.circ (4.2 KB, Apr 5, 2024, 2:16 PM)
- HALF SUB.circ (3.3 KB, Apr 5, 2024, 2:24 PM)
- NetBeansProjects

The system tray at the bottom shows the date and time as 28-01-2025, 09:49, and icons for battery level (74°F), weather (partly sunny), and network.

13. Write an R Program to Concatenate a Vector of Strings.

**PROGRAM CODE:**

```
v <- c("Prajiith", "Sandy", "Prashanth")
```

```
r <- paste(v, collapse = " ")
```

```
print(r)
```

The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help, and Addins. Below the menu is a toolbar with various icons. The main workspace consists of several tabs: LAB-11.R, LAB-12.R, LAB-13.R, LAB-14.R, LAB-15.R, LAB-16.R, LAB-17.R, LAB-18.R, LAB-19.R, and LAB-20.R. The LAB-11.R tab is active, displaying the R code:

```
v <- c("Prajiith", "Sandy", "Prashanth")
r <- paste(v, collapse = " ")
print(r)
```

To the right of the code editor is the Environment pane, which lists global variables:

- row\_2\_sum: 32L
- row\_sums: num [1:4] 28 32 36 40
- sorted: num [1:7] 6 7 14 24 26 27 30
- student\_aver.: Named num [1:5] 84 86 70.7 85.3 73.3
- sum\_columns: num [1:4] 66 72 78 84
- sum\_rows: num [1:3] 68 100 132
- t: num [1:3] 100 30 60
- total\_sum: 136L
- upper: chr [1:10] "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z"
- ...: chr [1:3] "Prajiith" "Sandy" "Prashanth"

Below the Environment pane is the Files pane, showing a file tree:

- RData (4.1 KB)
- .Rhistory (19 KB)
- 192324013-PRAJITH\_K-SSE-Guru... (867.5 KB)
- 192324013-PRAJITH\_K\_\_\_\_SSE-Guru... (226.3 KB)
- 192324013-PRAJITH\_K\_\_SSE-Guru... (413.3 KB)
- 192324013-PRAJITH\_K\_\_SSE-Guru... (259.1 KB)
- 192324013-PRAJITH\_K\_\_SSE-Guru... (867.6 KB)
- 192324013-PRAJITH\_K\_Oct.20th... (1 MB)
- auto.csv (30 B)
- Custom Office Templates
- desktop.ini (418 B)
- FULL ADDER.circ (42 KB)
- HALF SUB.circ (33 KB)
- NetBeansProjects

The bottom of the screen shows the Windows taskbar with various icons and system status indicators.

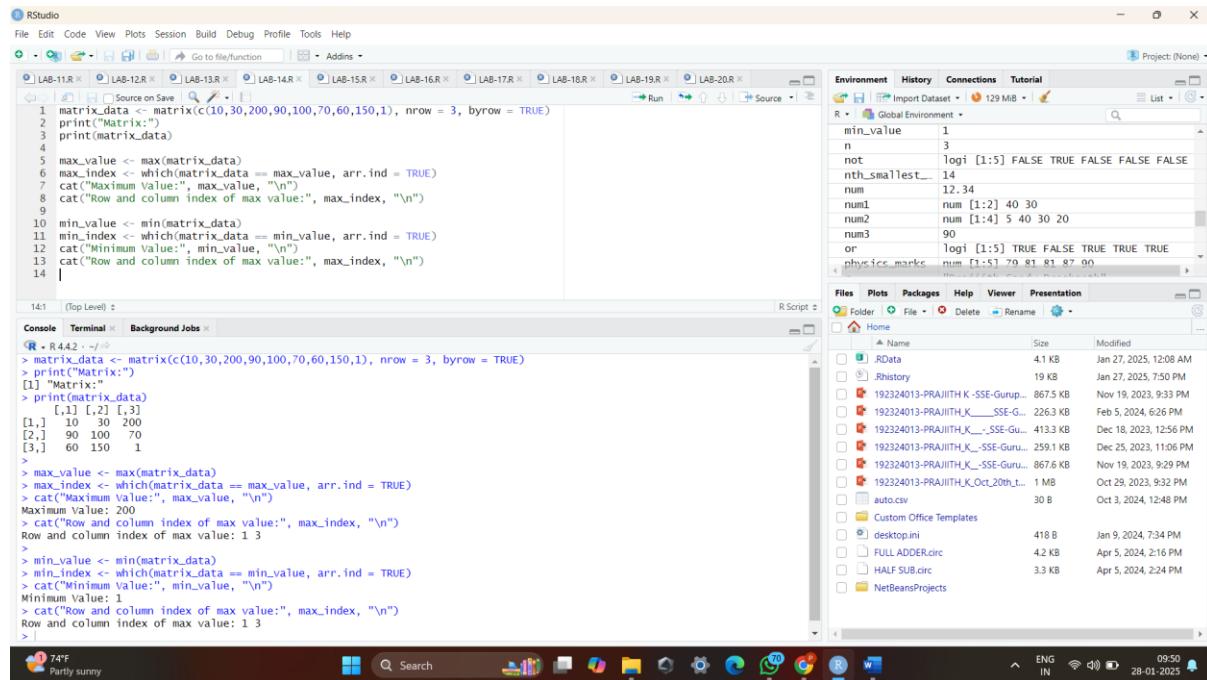
14. Write an R program to Find the row and column index of maximum and minimum value in a matrix in R.

### **PROGRAM CODE:**

```
matrix_data <- matrix(c(10,30,200,90,100,70,60,150,1), nrow = 3, byrow = TRUE)
print("Matrix:")
print(matrix_data)
```

```
max_value <- max(matrix_data)
max_index <- which(matrix_data == max_value, arr.ind = TRUE)
cat("Maximum Value:", max_value, "\n")
cat("Row and column index of max value:", max_index, "\n")
```

```
min_value <- min(matrix_data)
min_index <- which(matrix_data == min_value, arr.ind = TRUE)
cat("Minimum Value:", min_value, "\n")
cat("Row and column index of max value:", max_index, "\n")
```



The screenshot shows the RStudio interface with the following details:

- Environment pane:** Displays the global environment with variables:
  - min\_value: 1
  - n: 3
  - not: logi [1:5] FALSE TRUE FALSE FALSE FALSE
  - nth\_smallest: 14
  - num: 12.34
  - num1: num [1:2] 40 30
  - num2: num [1:4] 5 40 30 20
  - num3: 90
  - or: logi [1:5] TRUE FALSE TRUE TRUE TRUE
  - physics\_marks: num [1:53] 79 81 81 87 90
- Files pane:** Shows a list of files in the current directory, including RData, Rhistory, and several log files from different dates.
- Console pane:** Displays the R session history with the following output:

```
R > matrix_data <- matrix(c(10,30,200,90,100,70,60,150,1), nrow = 3, byrow = TRUE)
> print("Matrix:")
[1] "Matrix:
> print(matrix_data)
[1] 10 30 200
[2] 90 100 70
[3] 60 150 1
>
> max_value <- max(matrix_data)
> max_index <- which(matrix_data == max_value, arr.ind = TRUE)
> cat("Maximum Value:", max_value, "\n")
Maximum Value: 200
> cat("Row and column index of max value:", max_index, "\n")
Row and column index of max value: 1 3
>
> min_value <- min(matrix_data)
> min_index <- which(matrix_data == min_value, arr.ind = TRUE)
> cat("Minimum Value:", min_value, "\n")
Minimum Value: 1
> cat("Row and column index of max value:", max_index, "\n")
Row and column index of max value: 1 3
```

15. Write an R program to print the numbers from 1 to 100 and print "Fizz" for multiples of 3, print "Buzz" for multiples of 5, and print "FizzBuzz" for multiples of both.

**PROGRAM CODE:**

```
for(i in 1:100){  
  if(i%%3==0 & i%%5==0){  
    print("FizzBuzz")  
  }  
  else if(i%%3==0){  
    print("Fizz")  
  }  
  else if(i%%5==0){  
    print("Buzz")  
  }  
  else{  
    print(i)  
  }  
}
```

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Console Terminal Background Jobs

```
[1] 1
[1] 2
[1] "Fizz"
[1] 4
[1] "Buzz"
[1] "Fizz"
[1] 7
[1] 8
[1] "Fizz"
[1] "Buzz"
[1] 11
[1] "Fizz"
[1] 13
[1] 14
[1] "FizzBuzz"
[1] 16
[1] 17
[1] "Fizz"
[1] 18
[1] "Buzz"
[1] "Fizz"
[1] 22
[1] 23
```

74°F Partly sunny

RStudio

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Console Terminal Background Jobs

```
[1] 23
[1] "Fizz"
[1] "Buzz"
[1] 25
[1] "Fizz"
[1] 28
[1] 29
[1] "FizzBuzz"
[1] 31
[1] 32
[1] "Fizz"
[1] 34
[1] "Buzz"
[1] "Fizz"
[1] 37
[1] 38
[1] "Fizz"
[1] "Buzz"
[1] 41
[1] "Fizz"
[1] 43
[1] 44
[1] "FizzBuzz"
```

74°F Partly sunny

The screenshot shows the RStudio interface with the following details:

- Code Editor:** An R script named LAB-11.R containing the FizzBuzz code:

```
1 for(i in 1:100){  
2   if((i%3==0 & i%5==0)){  
3     print("FizzBuzz")  
4   }  
5   else if(i%3==0){  
6     print("Fizz")  
7   }  
8   else if(i%5==0){  
9     print("Buzz")  
10  }  
11  else{  
12    print(i)  
13  }  
14 }
```
- Console:** The output of the R script:

```
[1] "fizz"  
[1] "Buzz"  
[1] "fizz"  
[1] 52  
[1] 53  
[1] "fizz"  
[1] "Buzz"  
[1] 55  
[1] "fizz"  
[1] 58  
[1] 59  
[1] "fizzBuzz"  
[1] 61  
[1] 62  
[1] "fizz"  
[1] 64  
[1] "Buzz"  
[1] "fizz"  
[1] 67  
[1] 68
```
- Environment:** Global Environment pane showing variables like i=100L, int=7L, and logic=TRUE.
- File Explorer:** Shows a list of files in the current directory, including RData, Rhistory, and various log files from the PRAJITH\_K-SSE-Guru... series.
- System Tray:** Displays weather (74°F, Partly sunny), system status (ENG IN), and date/time (09:50 28-01-2025).

The screenshot shows the RStudio interface with the following details:

- Code Editor:** An R script named LAB-11.R containing the FizzBuzz code:

```
1 for(i in 1:100){  
2   if((i%3==0 & i%5==0)){  
3     print("FizzBuzz")  
4   }  
5   else if(i%3==0){  
6     print("Fizz")  
7   }  
8   else if(i%5==0){  
9     print("Buzz")  
10  }  
11  else{  
12    print(i)  
13  }  
14 }
```
- Console:** The output of the R script:

```
[1] "fizz"  
[1] "Buzz"  
[1] 71  
[1] "fizz"  
[1] 73  
[1] 74  
[1] "fizzBuzz"  
[1] 76  
[1] 77  
[1] "fizz"  
[1] 79  
[1] "Buzz"  
[1] "fizz"  
[1] 82  
[1] 83  
[1] "fizz"  
[1] "Buzz"  
[1] 86  
[1] "fizz"  
[1] 88  
[1] 89  
[1] "fizzBuzz"  
[1] 91
```
- Environment:** Global Environment pane showing variables like i=100L, int=7L, and logic=TRUE.
- File Explorer:** Shows a list of files in the current directory, including RData, Rhistory, and various log files from the PRAJITH\_K-SSE-Guru... series.
- System Tray:** Displays weather (74°F, Partly sunny), system status (ENG IN), and date/time (09:50 28-01-2025).

16. Write an R program to convert the list to a data frame with specific column names in R.

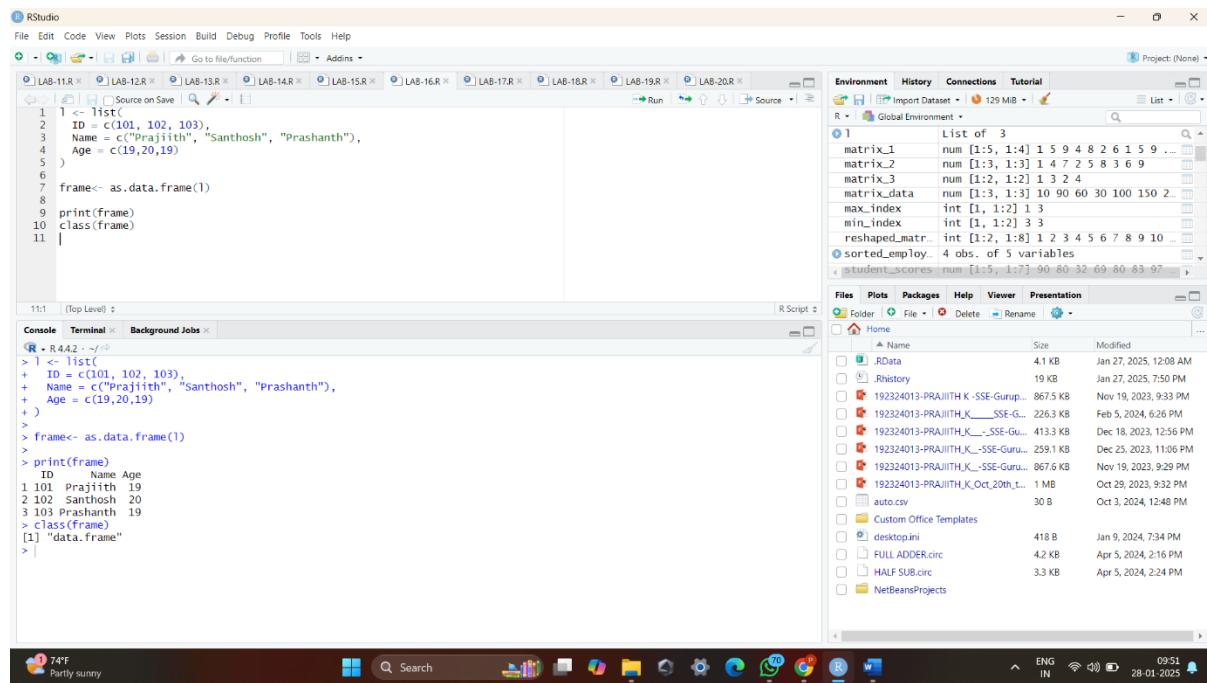
## **PROGRAM CODE:**

```
| <- list(  
|   ID = c(101, 102, 103),  
|   Name = c("Prajiith", "Santhosh", "Prashanth"),  
|   Age = c(19,20,19)  
)
```

```
frame<- as.data.frame(l)
```

```
print(frame)
```

class(frame)



17. Write an R program to create a Data Frames that contain details of 5 employees and display a summary of the data.

### **PROGRAM CODE:**

```
employee_details <- data.frame(id=c(1,2,3,4,5),  
                                name=c("Prajiith","Sandy","Prashanth","Mano","Deenesh"),  
                                age=c(18L,19L,18L,18,18),  
                                salary=c(100000.80,80000,90000,75000,79000))
```

```
print("Employee Details\n")
```

```
print(employee_details)
```

```
print("\nSummary of Employee Details")
```

```
summary(employee_details)
```

The screenshot shows the RStudio interface with the following components visible:

- R Console:** Displays the R code and its execution results. The code creates a data frame `employee\_details` with columns `id`, `name`, `age`, and `salary` for five employees. It then prints the employee details and displays the summary statistics for the data frame.
- Environment:** Shows the global environment with objects like `employee\_data`, `filtered`, `frame`, and `i`. It also lists variables such as `matrix\_1` through `matrix\_data` and `max\_index`.
- File Browser:** Shows the project structure with files like `RData`, `Rhistory`, and various log files from the `19324013-PRAJITH\_K-SSE-Guru...` series, along with `auto.csv` and `Custom Office Templates`.

18. Write an R program to find the maximum and the minimum value of a given vector.

**PROGRAM CODE:**

```
v <- c(43,57,29,10,72,90)
```

```
cat("Maximum number in the vector:",max(v),"\n")
```

```
cat("Minimum number in the vector:",min(v))
```

The screenshot shows the RStudio interface with the following details:

- Code Editor:** Displays the R script with the following code:

```
1 v <- c(43,57,29,10,72,90)
2
3 cat("Maximum number in the vector:",max(v),"\n")
4 cat("Minimum number in the vector:",min(v))
```
- Console:** Shows the output of the script:

```
R > R 4.4.2 - /-/ 
> v <- c(43,57,29,10,72,90)
>
> cat("Maximum number in the vector:",max(v),"\n")
Maximum number in the vector: 90
> cat("Minimum number in the vector:",min(v))
Minimum number in the vector: 10
> |
```
- Environment View:** Shows the global environment with the following objects:

Name	Type	Value
row_2_sum	num	[1:4] 28 32 36 40
row_sums	num	[1:7] 6 7 14 24 26 27 30
sorted	num	[1:7]
student_aver...	Named num	[1:5] 84 86 70.7 85.3 73.3
sum_columns	num	[1:3] 66 72 78 84
sum_rows	num	[1:3] 68 100 132
t	num	[1:3] 100 30 60
total_sum	chr	[1:10] "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z"
upper	num	[1:6] 43 57 29 10 72 90
- File Explorer:** Shows the file structure under the "Home" folder:

Name	Size	Modified
.RData	4.1 KB	Jan 27, 2025, 12:08 AM
Rhistory	19 KB	Jan 27, 2025, 7:50 PM
192324013-PRAJITH_K-SSE-Guru...	867.5 KB	Nov 19, 2023, 9:33 PM
192324013-PRAJITH_K_-SSE-Guru...	2263 KB	Feb 5, 2024, 6:26 PM
192324013-PRAJITH_K_-SSE-Guru...	4133 KB	Dec 18, 2023, 12:56 PM
192324013-PRAJITH_K_-SSE-Guru...	2591 KB	Dec 25, 2023, 11:06 PM
192324013-PRAJITH_K_-SSE-Guru...	867.6 KB	Nov 19, 2023, 9:29 PM
192324013-PRAJITH_K_Oct_20th_t...	1 MB	Oct 29, 2023, 9:32 PM
auto.csv	30 B	Oct 3, 2024, 12:48 PM
Custom Office Templates		
desktop.ini	418 B	Jan 9, 2024, 7:34 PM
FULL ADDER.circ	42 KB	Apr 5, 2024, 2:16 PM
HALF SUB.circ	35 KB	Apr 5, 2024, 2:24 PM
NetBeansProjects		
- System Tray:** Shows the weather (74°F, Partly sunny), system icons, and the date/time (28-01-2025, 09:52).

19. Write an R program to create an array with three columns, three rows, and two "tables", taking two vectors as input to the array. Print the array.

**PROGRAM CODE:**

```
v1 <- c(1, 2, 3, 4, 5, 6)
```

```
v2 <- c(7, 8, 9, 10, 11, 12)
```

```
v3 <- c(v1,v2)
```

```
array <- array(v3, dim = c(3, 3, 2))
```

```
print("The created array is:")
```

```
print(array)
```

The screenshot shows the RStudio interface with the following details:

- Code Editor:** Displays the R script with the provided code.
- Console:** Shows the output of the R code, including the creation of vectors v1, v2, and v3, the creation of the array, and the printed result.
- Environment View:** Shows the global environment with variables like student\_aver... and arrays like array.
- File Explorer:** Shows the file system structure with various R files and folders.
- Taskbar:** Shows the Windows taskbar with the RStudio icon, system tray icons, and system status.

```
R> v1 <- c(1, 2, 3, 4, 5, 6)
R> v2 <- c(7, 8, 9, 10, 11, 12)
R>
R> v3<- c(v1,v2)
R>
R> array <- array(v3, dim = c(3, 3, 2))
R> print("The created array is:")
[1] "The created array is:"
R> print(array)
, , 1
[,1] [,2] [,3]
[1,] 1 4 7
[2,] 2 5 8
[3,] 3 6 9
, , 2
[,1] [,2] [,3]
[1,] 10 1 4
[2,] 11 2 5
[3,] 12 3 6
R> 
```

20. Write an R program to assign grades based on a student's score using an if-else statement.

**PROGRAM CODE:**

```
score <- 78
```

```
if (score >= 90) {  
    grade <- "S"  
} else if(score >= 80) {  
    grade <- "A"  
} else if (score >= 70) {  
    grade <- "B"  
} else if (score >= 60) {  
    grade <- "C"  
} else if (score >= 50) {  
    grade <- "D"  
}  
else{  
    grade <- "E"  
}
```

```
cat("Score:", score, "\nGrade:", grade, "\n")
```

The screenshot shows the RStudio interface running on a Windows desktop. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help, and Addins. The main window has tabs for LAB-11.R through LAB-20.R. The script editor contains the following R code:

```
1 score <- 78
2
3 if (score >= 90) {
4   grade <- "S"
5 } else if(score >= 80) {
6   grade <- "A"
7 } else if (score >= 70) {
8   grade <- "B"
9 } else if (score >= 60) {
10  grade <- "C"
11 } else if (score >= 50) {
12  grade <- "D"
13 } else{
14  grade <- "E"
15 }
16 cat("Score:", score, "\nGrade:", grade, "\n")
17
18
```

The Environment pane shows variables like score (78), sorted (a numeric vector [1:7] with values 6, 7, 14, 24, 26, 27, 30), student\_avera\_ (a named numeric vector [1:5] with values 84, 86, 70.7, 85.3, 73.3), sum\_columns (a numeric vector [1:3] with values 66, 72, 78, 84), sum\_rows (a numeric vector [1:3] with values 68, 100, 132), t (a numeric vector [1:3] with values 100, 30, 60), total\_sum (136L), upper (a character vector [1:10] with values "Q", "R", "S", "T", "U", "V", "W", "X", "Y", "Z"), v (a numeric vector [1:6] with values 43, 57, 29, 10, 72, 90), and v1 (a numeric vector [1:6] with values 1, 2, 3, 4, 5, 6). The Files pane shows a folder structure under Home, including RData, Rhistory, and several log files from Feb 5, 2024, to Dec 18, 2023. The system tray at the bottom shows the date (28-01-2025), time (09:52), and battery status.